

64-Bit Market Outlook



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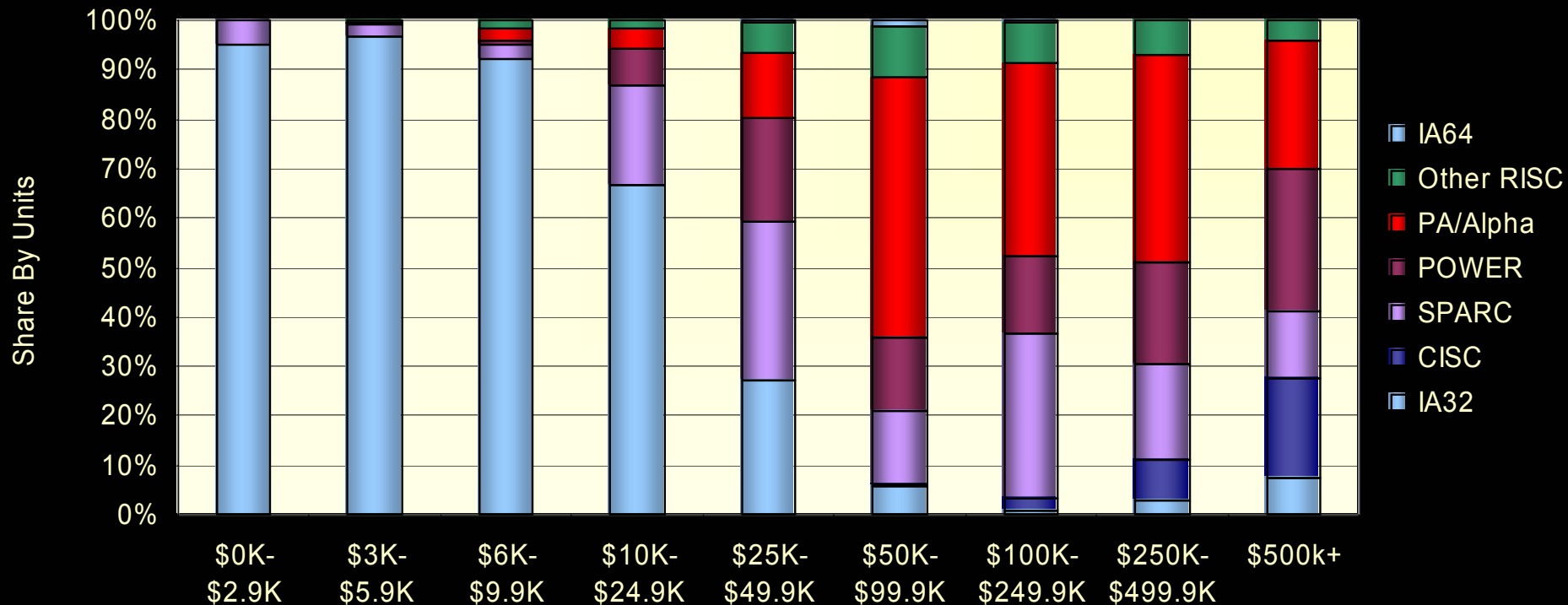
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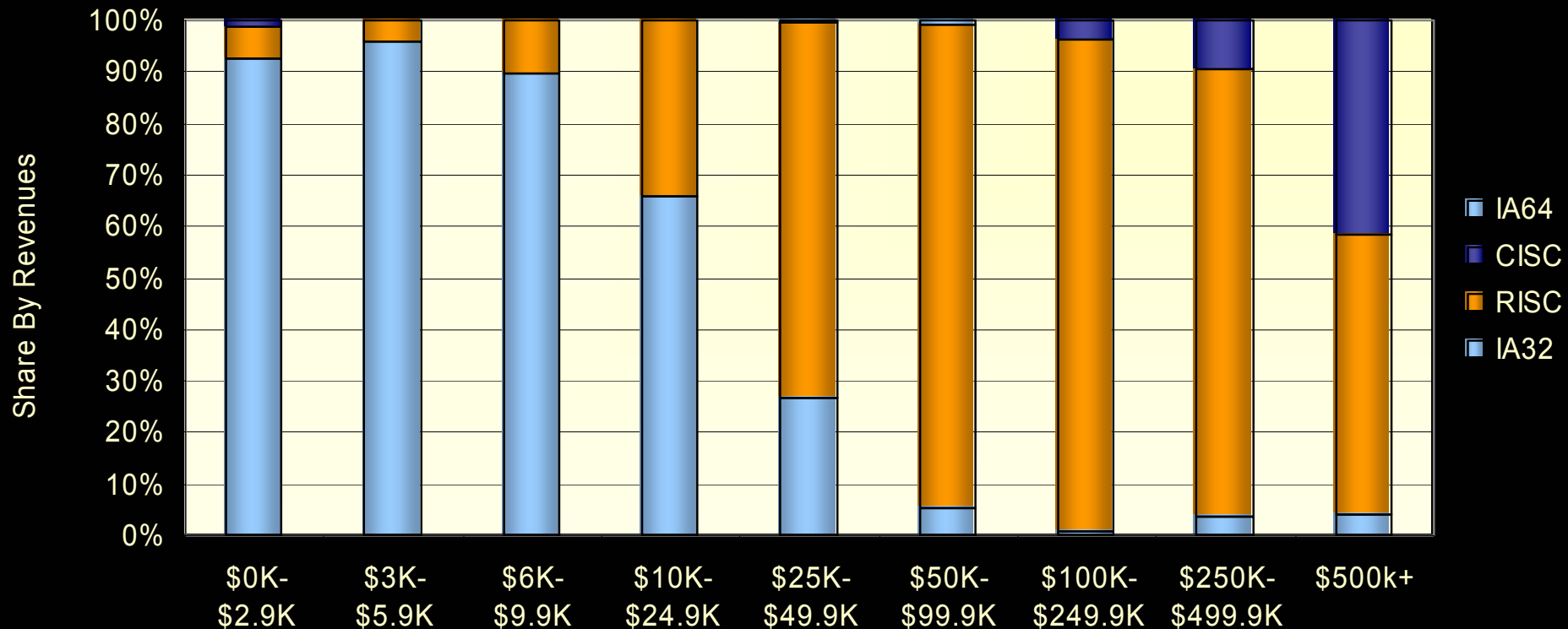
Agenda

- Server Market Snapshot
- Why the Fuss Over 64-Bits?
- Industry-Standard Processors Will Dominate the 64-Bit Server Market
- Which 64-Bit Industry-Standard Architecture Will Prevail?

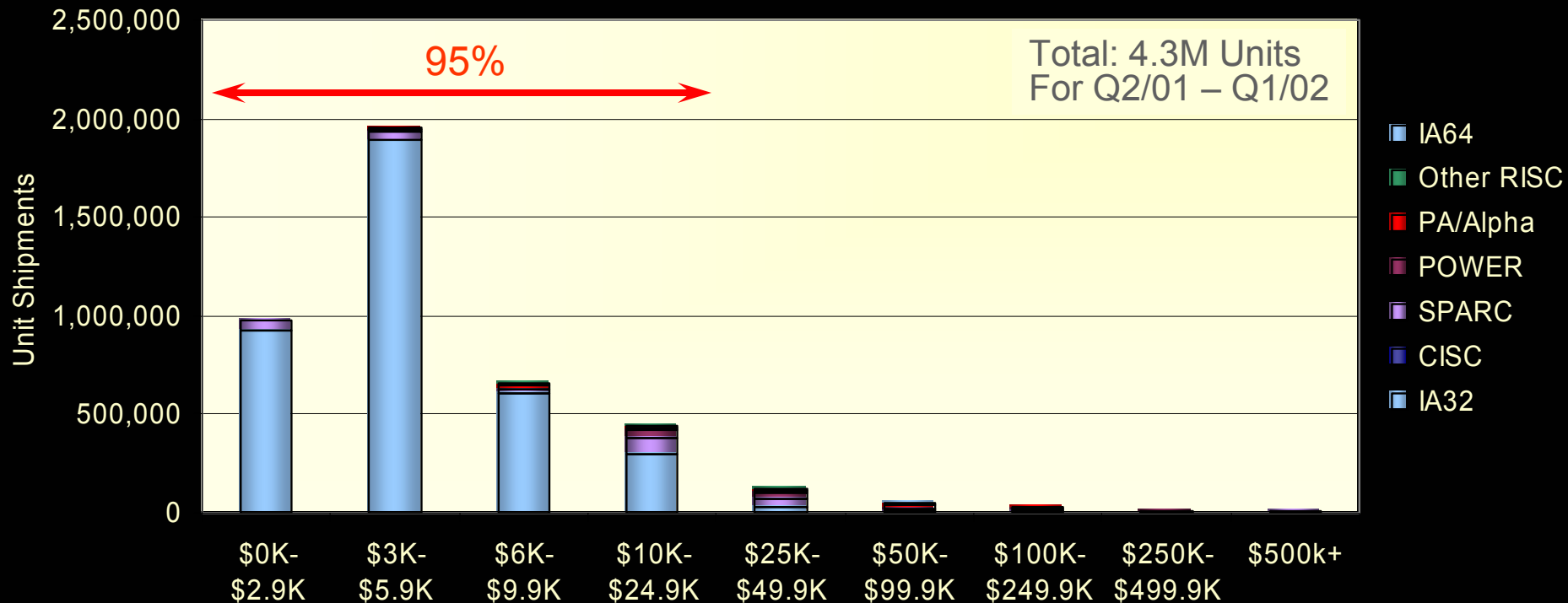
x86 Dominates Low-End Shipments; 64-Bit Systems Dominate High-End



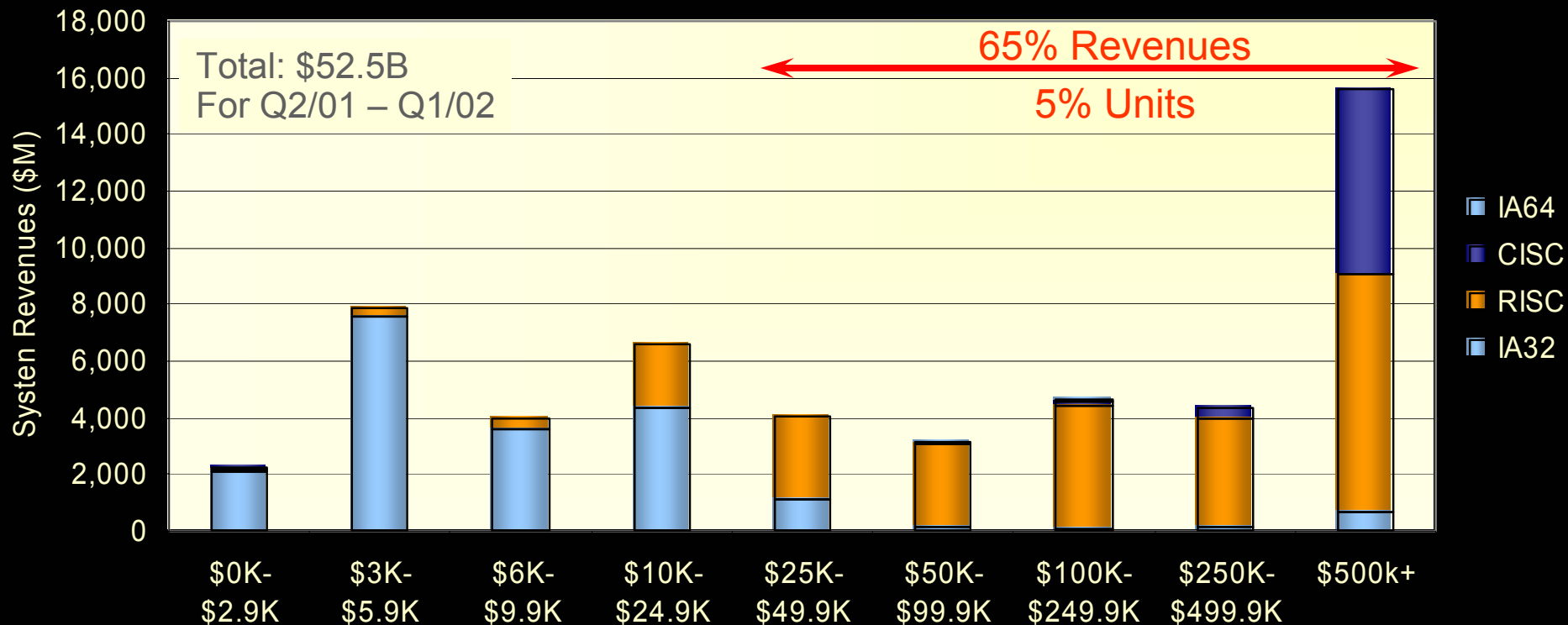
x86 Dominates Low-End Revenues; 64-Bit Systems Dominate High-End



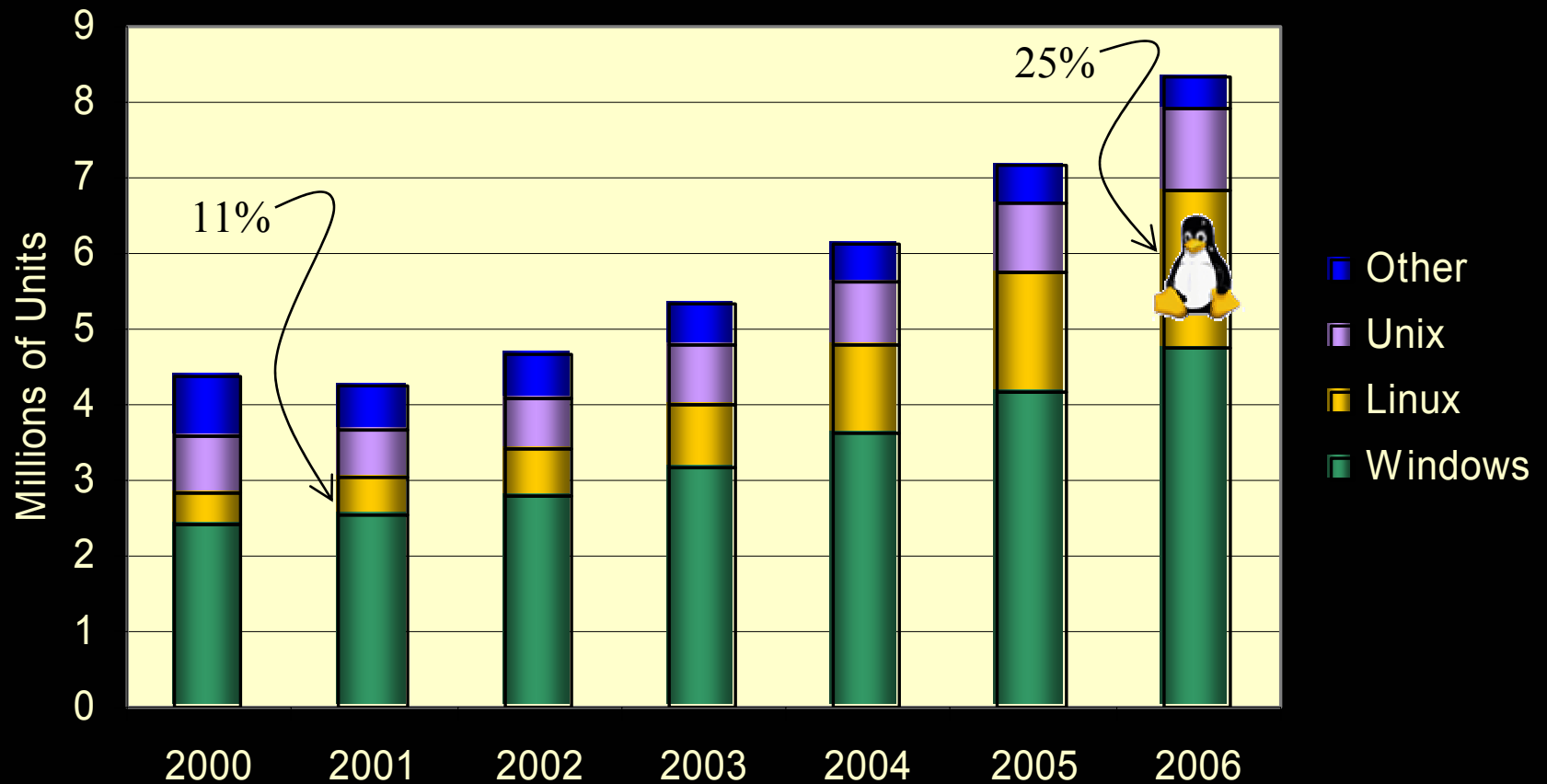
95 Percent of All Server Systems Sell at Prices Below \$25K



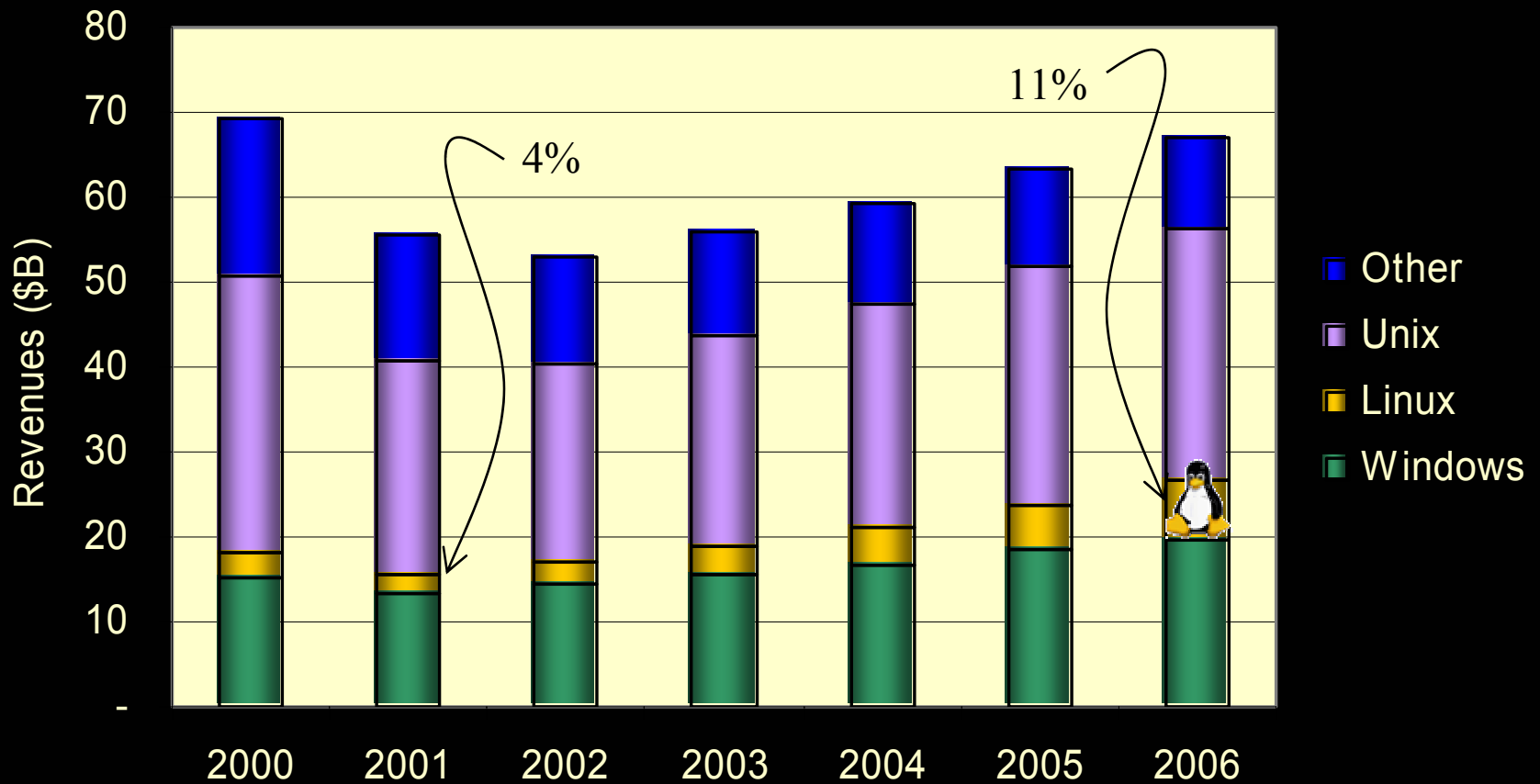
Systems Priced Above \$25K Generate 65 Percent of All Server Revenue



Linux System Shipments Growing at 35 Percent/Year



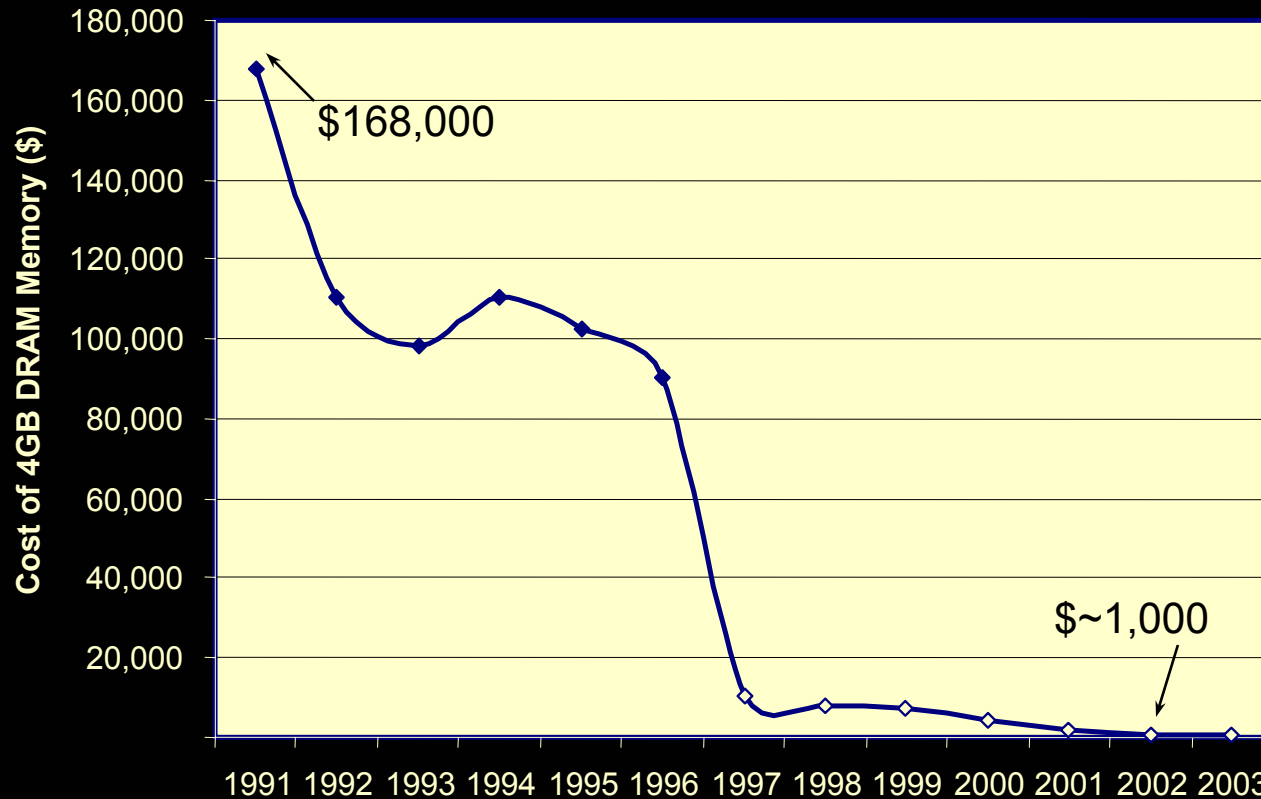
Linux System Revenues Growing at 26 Percent/Year



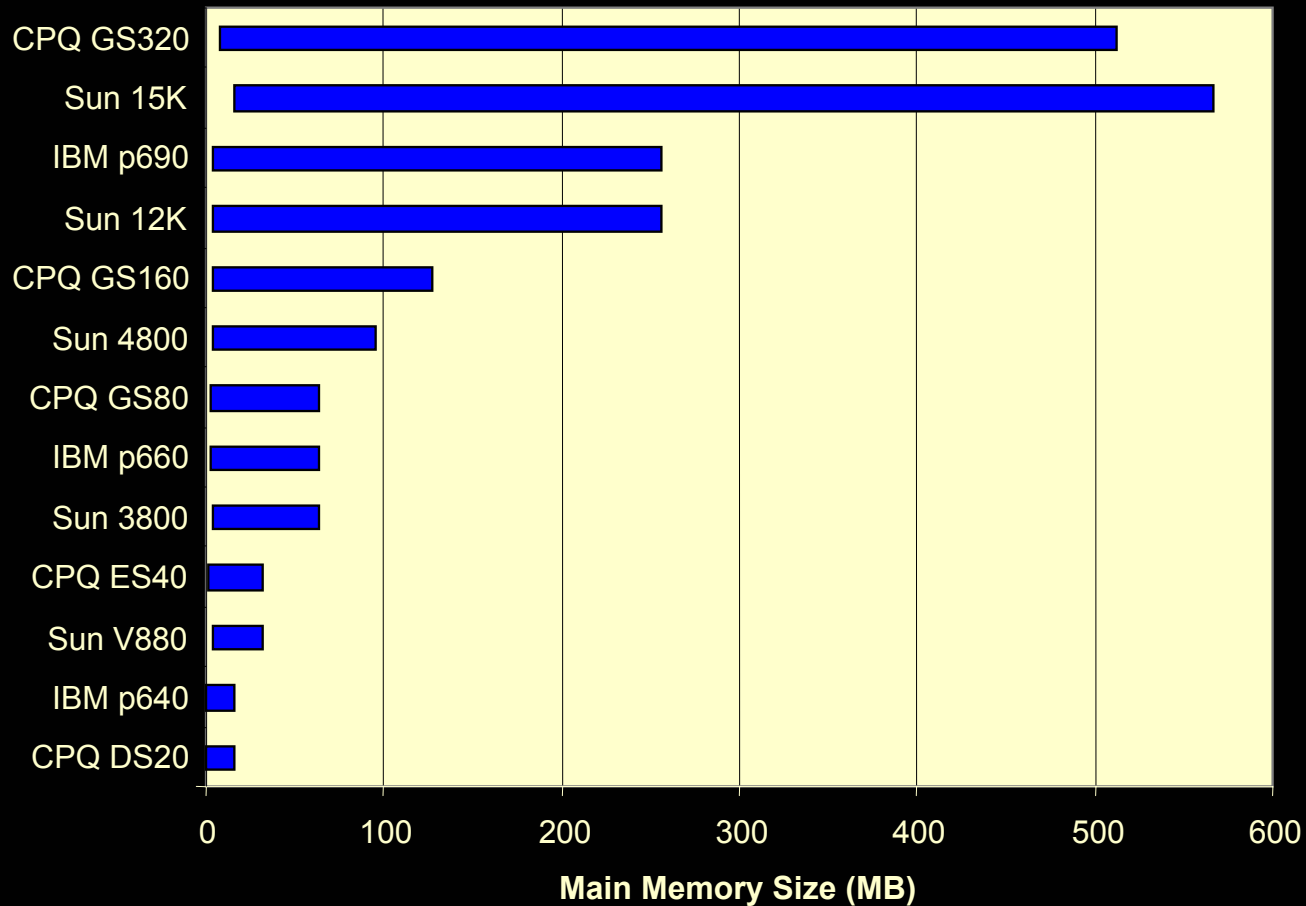
Why 64 Bits?

- $2^{32} = 4,294,967,296$
- $2^{64} = 18,446,744,073,709,551,616$
- Any Questions?

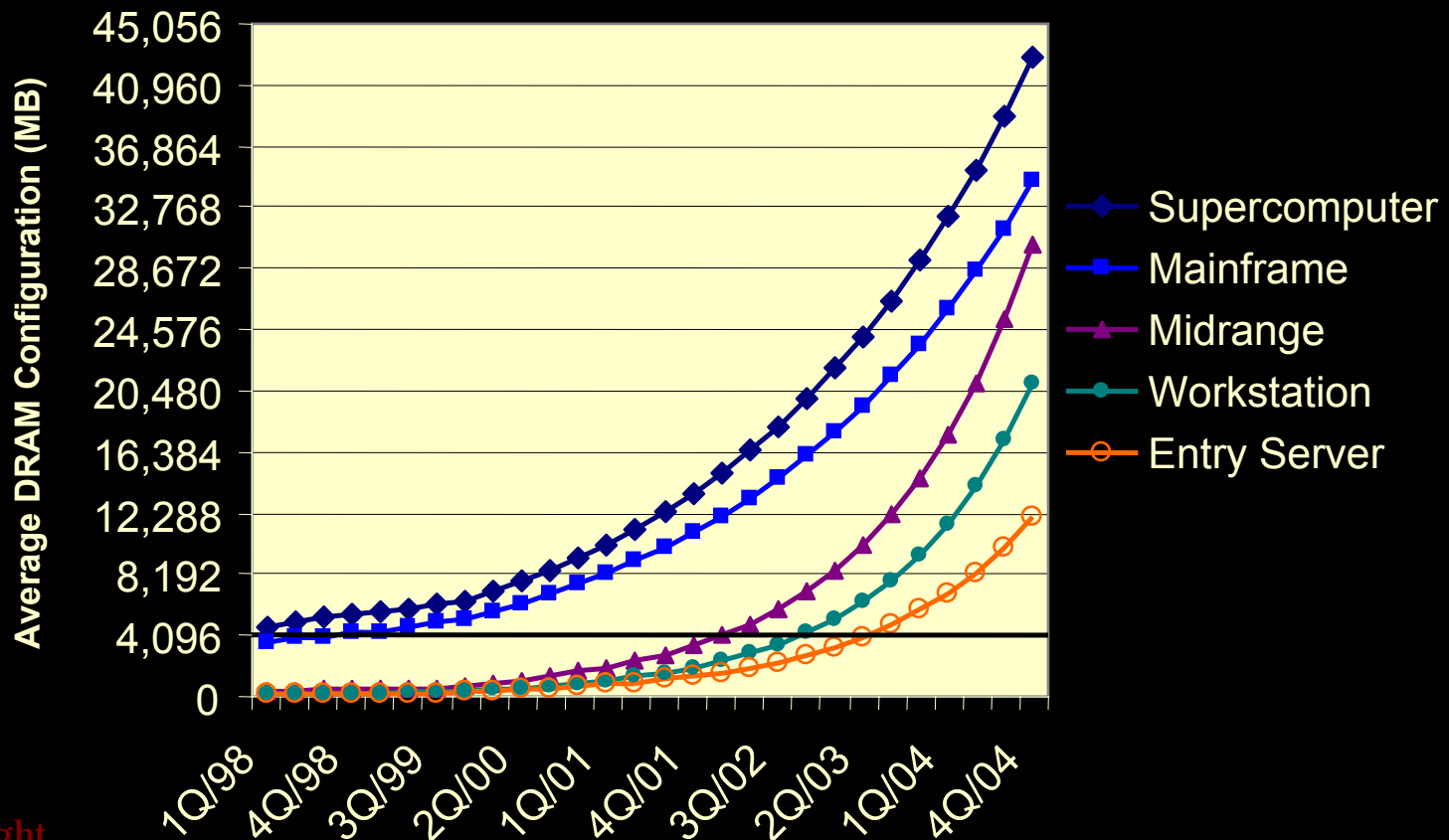
Eroding DRAM Prices Enable the Trend












Contemporary Mid-Range Systems Support up to 576 GB



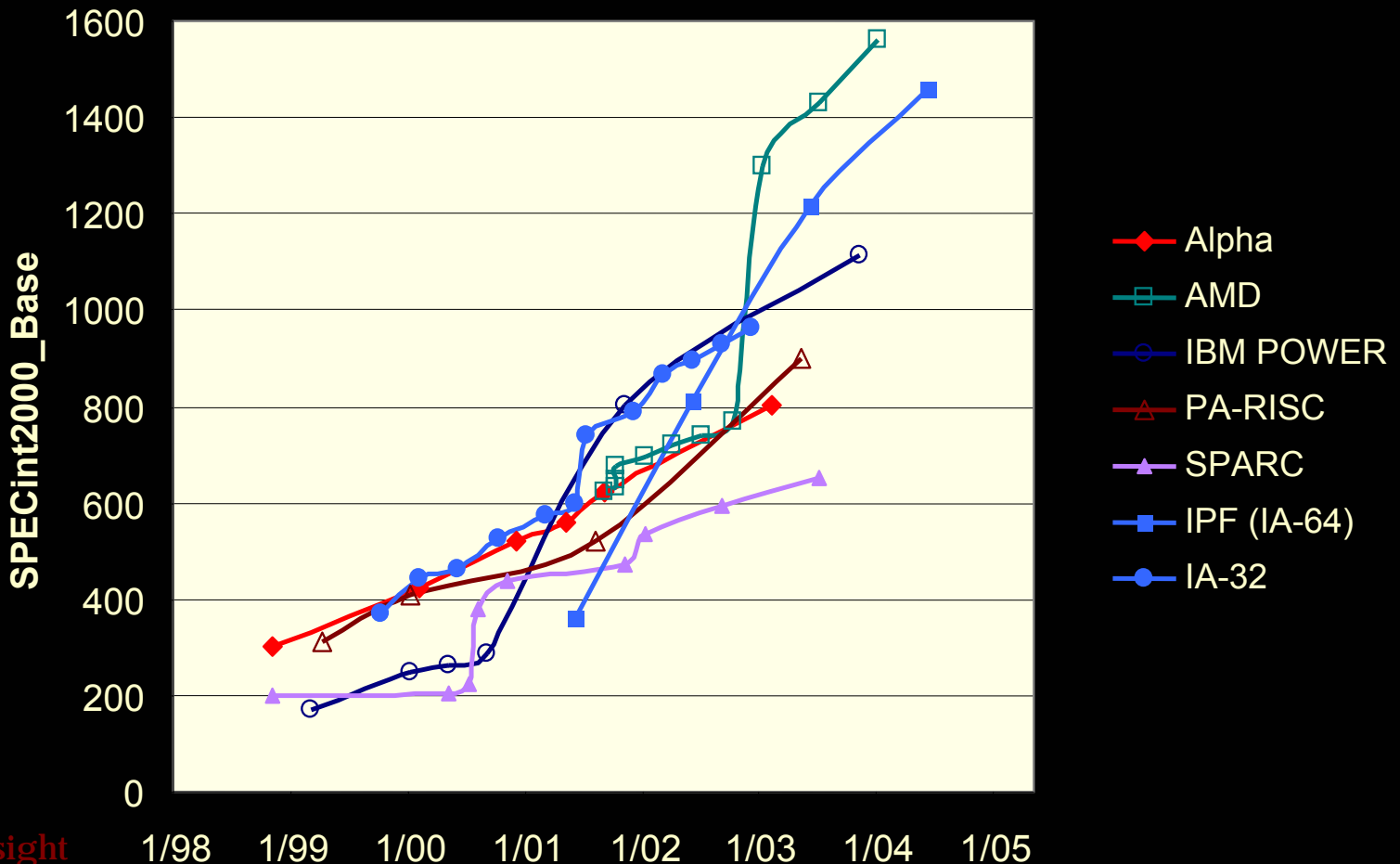
DRAM Configurations Will Soon Exceed 4 GB in All Segments



Industry Is Shifting From Vertical to Horizontal Structure

	Semiconductor Suppliers		Software Suppliers		System Suppliers				
Proprietary Technology									
Application Software									
Middle Ware									
Operating System									
System Hardware									
CPU Design									
CPU Fabrication									

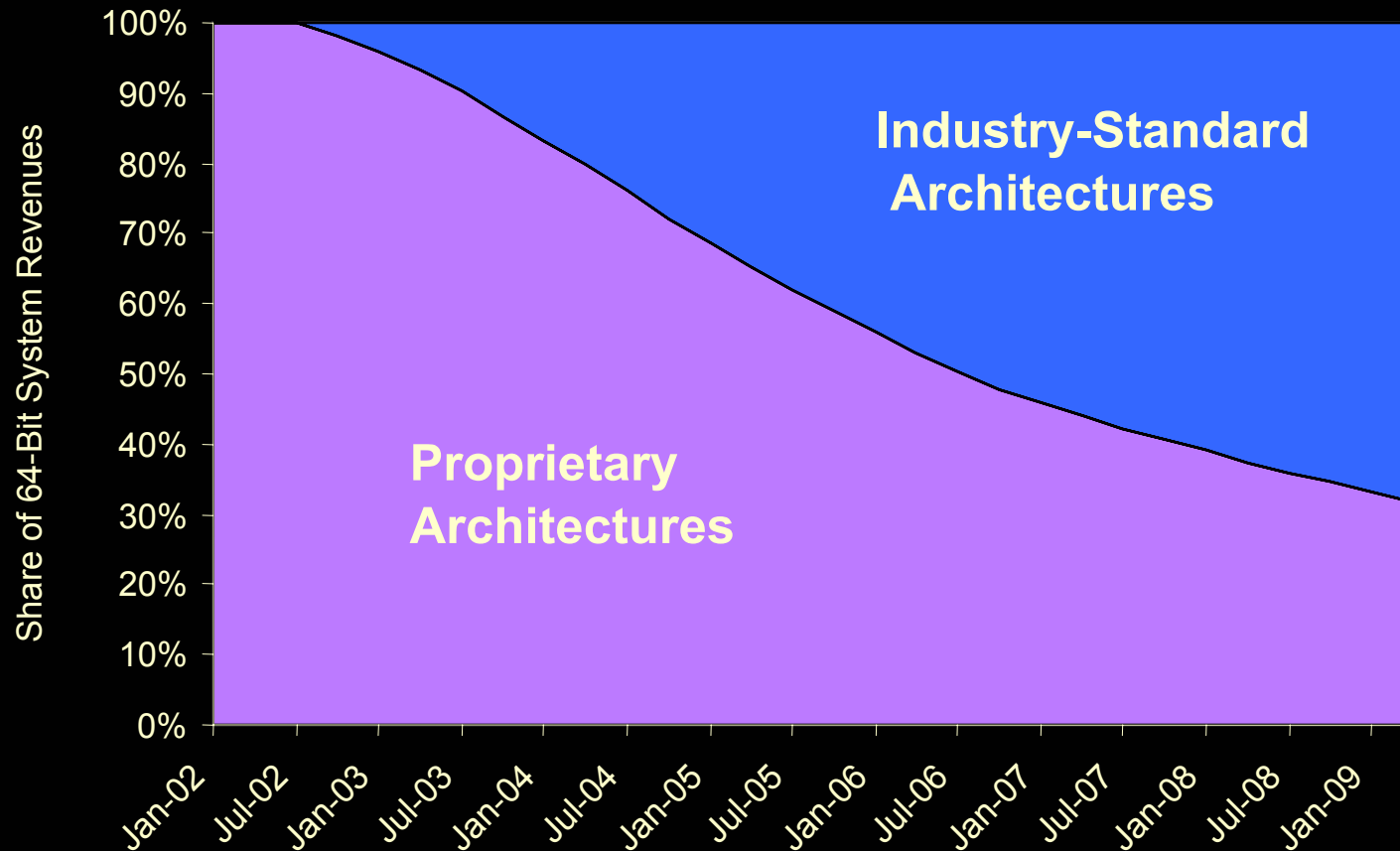
Industry-Standard Processors Will Capture MPU Performance Lead



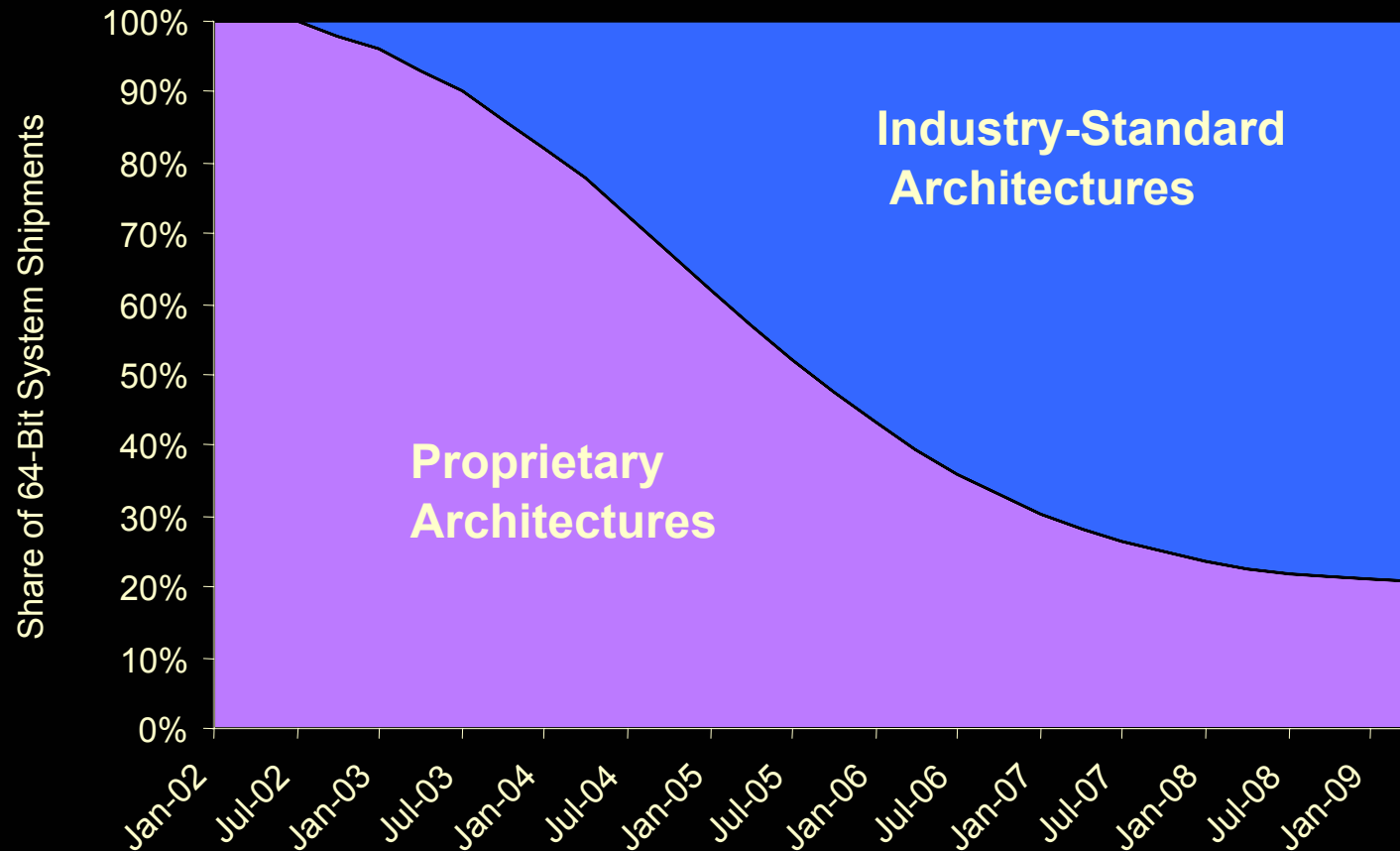
Industry-Standard Processors Offer Many Economic Advantages

- Lower R&D Costs Per Unit
- Lower Manufacturing Costs Per Unit
- Increased Availability of Complementary 3rd-Party Hardware and Software Packages [I.e., Network Effects]
- Reduced Switching Costs for End-Users
- Increased Utility for End-Users

Industry Standard 64-Bit Processors Will Gain Share



Proprietary Unit Share Erodes Even Faster



Low End Industry-Standard 64-Bit Systems Will Become Commoditized

System Configuration	Low-End	Mid Range/ High End Systems
Functional Requirements	Well Defined	Open-Ended
Architectural Opportunities	Constrained	Unlimited
R&D \$/Unit	Low	High
Unit Volume	High	Low
System Architecture	Increasingly Commoditized	Remains Proprietary

Two Roads Diverge






- IA-64
- EPIC
- *Unlike* x86 in
 - Almost All Regards
- Intel's *Slowest* CPU for 32-Bit Software
- Requires Traditional Core Logic Support
- Broad Industry Support

- X86-64
- CISC
- Like* x86 in
 - Almost All Regards
- AMD's *Fastest* CPU for 32-Bit Software
- CPU Subsumes Many Core Logic Features
- Industry Support TBD



Which 64-Bit Industry-Standard Architecture Wins?

		
Performance (64-Bit/32-Bit)	Great/Weak	Great/Great
Scalability	4-128 CPU	2-4 CPU
Reliability	ECC + MCA	ECC + MCA
Software Availability	32-Bit: N/A 64-Bit: ~ 100	32-Bit:  64-Bit: TBD
Economics	Big Die/Low Volume; Low R&D Leverage	Small Die/High Volume; Shares Desktop CPU R&D
Overall Position	Will Grab Share from 64-Bit RISC	Will Grab Share from 32-Bit CISC



Summary

- 64-Bit Architectures Prevail in Today's Mid-Range and High-End Systems
 - This Requirement Migrates to Low-End Systems over Next 2-3 Years
- Anticipate a Major Midrange/High-End Shift From Proprietary to Industry-Standard Architectures
 - A Long Term (5+ Years) Phenomenon
- Hardware and Software Suppliers That Exploit this Trend Will Gain Share at the Expense of Those Who Don't